

# **ST4241: Design and Analysis of Clinical Trials**

(2009-2010 Semester I)

## **Schedule:**

Time: Mondays 4pm - 6pm, Thursdays 4pm-6pm

Venue: S16/06-118

Final Exam: To be announced

## **Course Objective:**

- To introduce the students to the general knowledge of clinical trials.
- To equip the students with the methodology for design and analysis of clinical trials.
- To enable the students to do consultation and data analysis in clinical trials.
- To nurture general statistical thinking of the students.

## **Text Book:**

Joseph L. Fleiss

**The Design and Analysis of Clinical Experiments.**

Wiley Classics Library Edition 1999

John Wiley & Sons.

## **Assessment:**

Assignments 20%, Middle term exam 30%, Final exam 50%

## **Instructor:** Prof. Chen Zehua

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# Course Outline

## Part 0: Introduction

- **Overview of Clinical Trials**

- What are clinical trials
- General procedure and principles of clinical trials
- Statistical designs at a glance

## Part I: Clinical trials without control on prognostic variables

- Parallel groups design

- Randomization in parallel groups designs
- Analysis of variance and multiple comparisons
- Equality of variance, normality and transformations
- Analysis of several variables
- Non-normally distributed response variable
- Analysis of ordered categorical data

- Special cases of parallel groups study

- Several treatments versus a control
- The  $2 \times 2$  factorial experiment
- Bonferroni criterion for multiple comparisons
- A quantitative experimental factor

## Part II: Clinical trials with control on prognostic variables

- Blocking to control for prognostic variables
  - Randomized blocks experiment
  - Analysis of variance for randomized blocks
  - Nonparametric analysis
  - Missing values
- Stratification to control for prognostic variables
  - Comparison of two treatments
  - Treatment by stratum interaction
  - Pre- versus post-stratification
  - Comparison of more than two treatments
  - Multicenter studies
- Latin and Greco-Latin squares design to control particular factors
  - Single  $g \times g$  Latin square
  - Replicated Latin squares
  - Variations of the Latin squares
- Crossover study to control subject unit effects
  - Two period crossover study
  - Non-normally distributed response variable
  - More than two treatments

- Balanced incomplete block design
  - Application to an interexaminer reliability study
  - A BIBD as a two-period crossover study
- Repeated measurement studies.
  - Analysis of variance of repeated measurements
  - Multivariate analysis of repeated measurements
  - Multiple comparison involving time
  - A brief introduction to longitudinal data analysis

### **Part III: Other topics**

- Factorial Designs.
- Split-plot designs
- Sample-size determination